

REMARKS

Claims 1-8, 10-13, and 17-19 are pending in the application. Claims 1 and 3 have been amended to indicate that the capillary is a rectilinear capillary tube. Support for the amendments can be found at page 6, lines 19-24, Figs. 1 and 2. No new matter has been added by way of the amendments.

Rejection under 35 U.S.C. § 103(a)

Claims 1, 3, 5-8, 10, 13, 17, and 19 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,792,941 to Rye et al. (hereinafter "Rye") in view of U.S. Patent No. 6,581,438 to Hall et al. (hereinafter "Hall"). The Examiner suggests that it would have been obvious to arrive at the claimed invention based on the disclosure of open faced capillary based instruments disclosed by Rye and Hall. Applicants respectfully request reconsideration.

The present invention is directed to a method for determining the viscosities of liquids using a capillary that includes providing a horizontally arranged transparent rectilinear capillary tube, which is open on both sides, and connected at one end of the capillary to a reservoir containing the liquid to be measured; allowing the liquid to move along the capillary under capillary action only; and measuring the velocity and the distance of the liquid column in the capillary at time intervals.

In the specification it is disclosed that the shape of the capillaries is generally rectilinear, having an internal diameter constant over the relevant length (see page 6, lines 19-24). Figs. 1 and 2 clearly show the tubular shape of the capillaries. A tube is "a hollow elongated cylinder; esp: one to convey fluids" (Webster's Ninth New Collegiate Dictionary, Merriam-Webster, Springfield, MA, 1981, page 1269). Thus it is clearly disclosed in the specification that the capillary is a transparent rectilinear tube.

Rye discloses an open-channel capillary having a v-shaped groove in a flat wettable surface. The groove has timing marks and a source marker in which the specimen to be tested is deposited. The time of passage between the timing marks is recorded, and the ratio of surface tension to viscosity is determined.

Hall discloses a system for visualizing and quantifying capillary flow of liquids and using a high-speed, high-magnification camera system records the location and

shape of the moving liquid front in real-time, in-situ as it flows out of a source cavity, through an open capillary channel between two surfaces having a controlled capillary gap, and into an open fillet cavity. Hall does not disclose flow through a rectilinear capillary tube to determine the viscosity of a liquid as in the present invention.

Rye and Hall only disclose using open-channel capillaries in their respective methods and do not disclose, suggest or in any way motivate one skilled in the art to use a rectilinear capillary tube as in the present invention. Although the use of a rectilinear capillary tube is obvious from reading and understanding the present specification, Claims 1 and 3 have been amended to specifically recite this limitation.

As no combination of Rye and/or Hall disclose or in any way suggest using open-channel capillaries as in the present invention, the cited references cannot render the claims obvious and the rejection of Claims 1, 3, 5-8, 10, 13, 17, and 19 under 35 U.S.C. § 103(a) should be withdrawn.

Claims 4, 11, 12, and 18 stand rejected under 35 U.S.C. § 103(a) as being obvious over Rye in view of Hall and further in view of U.S. Patent No. 6,488,896 to Weigl et al. (hereinafter "Weigl"). The Examiner suggests that it would have been obvious to use the multiple channels for determining multiple viscosities in the combination of Rye and Hall in order to arrive at the claimed invention. Applicants respectfully request reconsideration.

The discussion above regarding Rye and Hall is incorporated herein.

Weigl discloses a cartridge constructed from a single material, such as a transparent plastic. Located within the cartridge are a series of microfluidic channels individually connected at one end to a circular inlet port, each of which is coupled to an atmosphere outside cartridge. The opposite ends of the channels all terminate in a circular chamber under a flexible membrane within the cartridge. The operation of the cartridge includes divided whole blood into three parts, to which different reagents are mixed. The blood is combined with a physiologic saline and a drop of each is place on the inlet ports separately. The mixture is drawn into the channels by capillary action. A reaction of the sample and reagent, such as coagulation, agglutination, or a change in viscosity, is observed within the channels as the fluids travel toward the chamber.

As a first matter, there is no disclosure in Weigl that would motivate one skilled in the art to replace the open-channel capillaries of Rye and Hall with rectilinear capillary tube as in the present invention.

Additionally, Weigle does not disclose how to determine the viscosity of liquids using a capillary by allowing the liquid to move along the capillary under capillary action only; and measuring the velocity and the distance of the liquid column in the capillary at time intervals. There is no disclosure in the combination of Rye, Hall, and Weigle to determine how to measure the viscosity of liquids using a rectilinear capillary tube by allowing the liquid to move along the capillary under capillary action only; and measuring the velocity and the distance of the liquid column in the capillary at time intervals.

Further, Weigle relates to single use cartridge and not to single use capillaries as in the present invention. There is no disclosure in the combination of Rye, Hall, and Weigle to use single use capillaries.


As no combination of Rye, Hall, and Weigle discloses the presently claimed invention, the claims are not obvious over the cited prior art and the rejection of Claims 4, 11, 12, and 18 under 35 U.S.C. § 103(a) should be withdrawn.

CONCLUSION

Applicants request that the Amendment be entered as it places the application in form for allowance and/or in better form for appeal. As the rectilinear capillary tube structure of the capillary was readily apparent, the Examiner has been able to give the amendment adequate consideration as well as an adequate opportunity to conduct a prior art search.

Applicants believe that the present application is in condition for allowance. Accordingly, reconsideration of the rejections and a Notice of Allowance are respectfully requested for Claims 1-8, 10-13, 17-19. If the Examiner is of the opinion that the present application is in condition for other than allowance, he is requested to contact the Applicants' agent at the telephone number given below so that additional changes to the claims may be discussed.

Respectfully submitted,

By 

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